

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

FCC 94-11

In the Matter of)

Amendment of the Commission's Rules to)
Establish Rules and Policies Pertaining)
to a Mobile Satellite Service in the)
1610-1626.5/2483.5-2500 MHz)
Frequency Bands)

CC Docket No. 92-166

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NOTICE OF PROPOSED RULEMAKING

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I. INTRODUCTION

1. The Commission is considering several proposals to construct satellite systems that would provide a variety of voice and data mobile satellite services (MSS) in the 1610-1626.5/2483.5-2500 MHz frequency bands (MSS Above 1 GHz Service).¹ This Notice of Proposed Rulemaking proposes rules and policies to govern the service, which we expect to include both domestic and international operations. Operations outside the U.S. will be subject to the regulatory requirements of those countries in which these systems may seek to operate.²

2. This new mobile satellite service has the potential to provide not only a variety of new services for users in this country, but also to provide communication services to parts of the world that have previously been grossly underserved. Among the almost limitless applications of the proposed systems are cellular-like mobile services to users anywhere, position location services,

¹ We recently allocated these frequencies for MSS. See Report and Order, ET Docket No. 92-28, FCC 93-547 (adopted Dec. 13, 1993) (Allocation Order). While we recognize that other MSS systems have been authorized domestically and internationally in other frequency bands above 1 GHz, we will refer to a mobile-satellite service in the 1610-1626.5/2483.5-2500 MHz frequency bands as the "MSS Above 1 GHz Service" in this Notice.

² The provision of service outside the United States by U.S. licensees will subject them to other countries' regulatory requirements. Issues relating to the United States' international obligations will be addressed when U.S. licenses have been awarded and the licensees apply to administrations of other countries to provide service outside the United States.

search and rescue communications, disaster management communications, environmental monitoring, paging services, facsimile transmission services, cargo tracking, and industrial monitoring and control.³ Domestically, this service will help meet the demand for a seamless, nationwide communications system that is available to all and that can offer a wide range of voice and data telecommunication services. In addition to enhancing the competitive market for cellular-like service in those areas served by cellular providers, this new mobile satellite service will offer those Americans in rural areas that are not otherwise linked to the communications infrastructure immediate access to a feature-rich communications network. Low-Earth orbiting (LEO) satellite system configurations can potentially extend these benefits throughout the world, and can provide those countries that have not been able to develop a nationwide communication service an "instant" global telecommunications infrastructure at minimal cost. This network can be used to provide both basic and emergency communications to their entire populations.

3. The service also has a significant potential to stimulate economic growth both in the United States and abroad. A potential multi-billion dollar industry will be enabled, creating opportunities for economic growth in a variety of markets and sub-markets. First, the estimated costs to construct the applicants' space segments range from \$97 million to over \$2 billion each. The manufacturing costs for the ground segment, which includes both user transceiver units and gateway stations, are expected reach hundreds of millions of dollars more. Thus, manufacturing these systems alone can lead to a substantial investment in the U.S. economy and create a significant number of high-paying jobs in the areas of research and development, production, and administration. As the systems are implemented, additional growth opportunities will be created. One of the applicants, for example, states that it expects that by 2001 the demand for user transceivers will be 1.3 million in the United States and an additional 4.7 million worldwide.⁴ This will potentially create a major global industry whose function will be to provide users with mobile units and end services. As demand grows and as markets for these goods and services are developed, additional employment opportunities will be created. Customer costs for the user transceivers, which are estimated at between \$200 to \$2000 per terminal depending upon its capability,⁵ and user service charges will represent a further and continuing investment in the economies of the host countries. Finally, the enhanced communications services offered by this industry will, of themselves, create a broad secondary economic growth potential. Immediate access to an advanced global communications infrastructure can increase the efficiency of existing businesses and create new ones; provide underdeveloped countries with a state-of-the-art communications system that can be used for governmental, educational, personal, and commercial purposes; and contribute to the quality of life which will, in turn, allow for economic development.

³ See para. 86, *infra*, regarding the use of MSS Above 1 GHz for emergency communications.

⁴ Application of Motorola Satellite Communications, Inc. at 11.

⁵ *Id.* at 38.

4. The United States has led the world in developing and implementing satellite technology. We expect many of the economic, cultural efficiency and other gains we have seen in the fixed-satellite industry to be reflected in the new mobile satellite industry. The proposals before us represent an opportunity for the United States to continue its leadership role in promoting global development through enhanced communications infrastructures and services. This Notice is a first step in licensing mobile voice systems that can make this enhanced telecommunications network available both in the United States and abroad.

II. BACKGROUND

5. This proceeding was initiated in late 1990, when Ellipsat Corporation (Ellipsat) and Motorola Satellite Communications, Inc. (Motorola) filed applications to construct LEO satellite systems⁶ in the 1610-1626.5/2483.5-2500 MHz bands (1.6/2.4 GHz bands) and the 1610-1626.5 MHz band (1.6 GHz band), respectively.⁷ These bands are allocated to, among other services, the radiodetermination satellite service (RDSS), which encompasses both satellite radionavigation and radiolocation services.⁸ The systems proposed by Ellipsat and Motorola were intended to provide voice and data mobile satellite services in addition to RDSS.⁹ These include nationwide near-toll quality two-way voice communications to mobile and fixed users with interconnection to the public switched network, paging services, data/facsimile transmission services, data collection services, tracking and monitoring services, and voice dispatch services.¹⁰ Motorola also indicated that it planned to provide these services on a worldwide basis.

⁶ We use the term "low-Earth orbit satellite system" to describe any system that is not operating in geostationary satellite orbit. This includes systems operating in lower-altitude orbits, medium-altitude orbits, and highly elliptical orbits.

⁷ Ellipsat proposed the 1.6 GHz band for Earth-to-space transmissions and the 2.4 GHz band for space-to-Earth transmissions. Motorola proposed to use the 1.6 GHz band for bidirectional transmissions. Motorola later modified its application to request the 1616-1626.5 MHz band only. See Minor Amendment filed by Motorola (Aug. 14, 1992).

⁸ See 47 C.F.R. § 2.106. See also discussion at paras. 48-69, infra.

⁹ Both Ellipsat and Motorola requested a waiver of the U.S. Table of Frequency Allocations, 47 C.F.R. § 2.1, to permit this non-conforming use of the RDSS bands. These waiver requests have become moot in light of our decision to allocate these bands to MSS on a co-primary basis. See Allocation Order, note 1, supra.

¹⁰ MSS terminals operating in this band will be prohibited from being used on civil aircraft unless the terminal has a direct physical connection to the aircraft Cabin Communication system. See discussion at paras. 55-56, infra.

6. The Commission placed the Ellipsat and Motorola proposals on public notice and established a June 2, 1991 cut-off date for filing applications to be considered concurrently with them.¹¹ In response, four applications were filed -- three proposing to construct LEO satellite systems¹² and one proposing to add additional frequencies onto an authorized geostationary satellite-orbit (GSO) system.¹³ Ellipsat also filed a construction application for a second-generation system. The five LEO proponents request authority to implement a variety of satellite constellations, ranging from Ellipsat's first generation six satellite, single orbit Ellipso system to Motorola's 66 satellite, six orbit Iridium system. Accompanying several of the system proposals were petitions for rulemaking to reallocate the 1.6/2.4 GHz bands for MSS operations domestically on a co-primary basis with other primary services in the band, including RDSS.¹⁴

7. In February 1992, a co-primary international allocation for MSS was made at the World Administrative Radio Conference (WARC-92).¹⁵ Specifically, the 1610-1626.5 MHz band was allocated on a primary basis for MSS Earth-to-space operations and the 2483.5-2500 MHz band was allocated on a primary basis for MSS space-to-Earth operations. In addition, a secondary allocation was made for MSS space-to-Earth operations in the 1613.8-1626.5 MHz segment of the 1.6 GHz band. Shortly thereafter, the Commission proposed an identical domestic allocation for MSS.¹⁶ In August 1992, we proposed to establish a Negotiated

¹¹ Public Notice, Report No. DS-1068, 6 FCC Rcd 2083 (1991) (Cut-Off Notice).

¹² These applications were filed by Constellation Communications, Inc. (Constellation), Loral Qualcomm Satellite Services, Inc. (LQSS), and TRW, Inc. (TRW).

¹³ AMSC Subsidiary Corporation (AMSC) filed an application to modify its authorized upper L-band (1545-1559/1646.5-1660.5 MHz) MSS system to include the 1515-1525 MHz and 1616.5-1626.5 MHz frequency bands. The Commission, however, declined to propose to allocate the 1515-1525 MHz band for MSS operations. We stated that MSS operations in this band would interfere with existing aeronautical telemetry operations and would be inconsistent with a U.S. allocation footnote adopted at the WARC-92 international conference. Notice of Proposed Rulemaking and Tentative Decision, ET Docket No. 92-28, 7 FCC Rcd 6414 (1992) (Allocation NPRM), at n.15.

¹⁴ "Primary" services have equal rights to operate in particular frequencies. Stations operating in primary services are protected against interference from stations of "secondary" services. Moreover, stations operating in a secondary service cannot claim protection from harmful interference from stations of a primary service. See 47 C.F.R. §§ 2.104(d) and 2.105(c).

¹⁵ See International Telecommunication Union, Final Acts of the World Administrative Radio Conference (WARC-92), Malaga-Torremolinos (1992).

¹⁶ Allocation NPRM, note 13, supra. The proposed allocation was later adopted in Allocation Order, note 1, supra.

Rulemaking Committee pursuant to the Negotiated Rulemaking Act of 1990¹⁷ that would provide expert advice and recommendations on technical and operational matters related to establishing a mobile satellite service in the 1.6/2.4 MHz bands.¹⁸ We requested comment on this proposal and solicited applications for Committee membership from all parties that would be significantly affected by the outcome of the proceeding.

8. Based on the comments, the Commission decided to proceed with a negotiated rulemaking. In December 1992, we announced the formation of the "MSS Above 1 GHz Negotiated Rulemaking Committee."¹⁹ The Committee's 16 members included representatives of all six pending MSS applicants, other users of the 1.6/2.4 GHz bands and adjacent bands, one potential future MSS applicant, and one potential equipment manufacturer.²⁰ The Committee's charter was filed with Congress on January 6, 1993, the date of the Committee's initial meeting, and expired by its own terms on April 6, 1993.

9. During its three-month duration, the full Committee or one of its three informal working groups met almost daily. The Committee's work included technical matters relating to compatibility among the proposed MSS systems (inter-system sharing issues), compatibility between MSS and other services in the band or in adjacent bands (inter-service sharing issues), and operations of MSS feeder links²¹ and intersatellite links.²² The Committee reached a consensus with respect to many of these matters and included proposed rules or policies

17 5 U.S.C. §§ 581 et seq., Pub.L. 101-648 (November 28, 1990).

18 Public Notice, DA 92-1085, 7 FCC Rcd 5241 (1992).

19 Public Notice, Report No. DS-1265, 7 FCC Rcd 8614 (1992).

20 The Committee members included representatives from AMSC, Ellipsat, Motorola, Constellation, TRW, LQSS, the Commission, the Federal Aviation Administration (FAA), the Committee on Radio Frequencies (CORF), the National Aeronautics and Space Administration (NASA), the Wireless Cable Association International, Inc. (Wireless Cable), Rockwell International Corporation (Rockwell), Communications Satellite Corporation (Comsat), the U.S. Army, Aeronautical Radio, Inc. (ARINC), and Celsat, Inc. (Celsat).

21 "Feeder links" are the transmission links between a fixed "gateway" earth station and the satellites. See para. 70, infra.

22 "Intersatellite links" are direct transmission links between in-orbit satellites, with no intervening earth station. See para. 78, infra.

in these areas in its Report to the Commission (Committee Report).²³ The Committee was not, however, able to reach a consensus on several issues. Most significantly, it was not able to develop an inter-system sharing proposal that would allow all proposed systems to be accommodated. Instead, it included two independent attachments discussing this issue in the Committee Report.²⁴

10. We find the Committee's recommended rules and policies generally to be in the public interest and, in accordance with the Negotiated Rulemaking Act, these proposals form the basis for the rules we propose in this Notice.²⁵ With respect to the matters about which the Committee did not reach a consensus or where a representative of an affected interest did not participate, we propose rules where the record has been sufficiently developed and solicit additional comment where it has not.²⁶

III. DISCUSSION

A. Licensing Procedure

1. Background

11. The licensing procedure and qualification requirements adopted for a new satellite service depend, to a large extent, upon the technical compatibility of the proposed systems, the amount of bandwidth allocated for the service, and the nature of any existing use of that bandwidth. When possible, we prefer to leave spacecraft design decisions to the space station licensees because the licensees are in a better position to determine how to tailor their

²³ Report of the MSS Above 1 GHz Negotiated Rulemaking Committee (April 6, 1993). The Negotiated Rulemaking Act defines "consensus" as unanimous concurrence among the interests represented on the Committee, although it permits the Committee to agree to another specified definition. 5 U.S.C. § 582(2). The Committee decided that it would define consensus as unanimous concurrence, but noted that if unanimity could not be reached, the situation would be described in the Committee Report.

²⁴ See Final Report of the Majority of the Active Participants of Informal Working Group 1 to Above 1 GHz Negotiated Rulemaking Committee, Annex 1/Attachment 1 to Committee Report (Annex 1/Attachment 1), which was supported by AMSC, Celsat, Constellation, Ellipseat, LQSS, and TRW; Report of Motorola on Band Segmentation Sharing to Working Group 1 of the Above 1 GHz Negotiated Rulemaking Committee, Annex 1/Attachment 2 to Committee Report (Annex 1/Attachment 2).

²⁵ 5 U.S.C. § 583(a)(7).

²⁶ Pursuant to the Negotiated Rulemaking Act, we are required to use, to the maximum extent possible consistent with our legal obligations, the consensus of the Committee as the basis for the rules we propose for notice and comment. 5 U.S.C. § 583(a)(7). Where the Committee has not reached consensus, we are under no similar obligation. Nevertheless, the Commission indicated that if a consensus was not reached, we would consider majority and minority input.

systems to meet the particular needs of their customer base.²⁷ Consequently, if the applicants can develop or agree to an engineering solution or sharing scheme by which all proposed systems can be accommodated, we generally adopt this approach if it is otherwise in the public interest.²⁸ In situations where all applicants' proposed systems cannot be accommodated, however, we must devise a method consistent with the public interest for choosing among them. In such cases, we have, as an initial matter, imposed rigorous financial and technical requirements as a means of ensuring that those granted licenses are, in fact, capable of expeditiously implementing state-of-the-art systems that will serve the public interest, convenience, and necessity.²⁹ If it is not possible to accommodate all applicants meeting the adopted qualification criteria, a further processing approach must be selected.

12. Here, the applicants have proposed three distinct system architectures -- two for LEO systems and one for a GSO system. The LEO systems proposed by Ellipsat, Constellation, TRW, and LQSS each employ spread spectrum code division multiple access (CDMA) techniques.³⁰ This architecture would permit multiple LEO and GSO CDMA systems to share the same frequencies when operating under certain technical constraints. The other LEO system architecture is advanced by Motorola. Motorola's system would operate bi-directionally in a portion of the 1.6 GHz band only, using time division/frequency division

²⁷ See, e.g., Assignment of Orbital Locations to Space Stations in the Domestic Fixed-Satellite Service, 3 FCC Rcd 6972 (1988) (1988 Domsat Processing Order), at para. 2; see also Domestic Fixed-Satellite Service, 88 FCC 2d 318 (1981).

²⁸ See, e.g., Amendment of the Commission's Rules to Establish Rules and Policies Pertaining to a Non-Voice, Non-Geostationary Mobile-Satellite Service, CC Docket No. 92-76, 8 FCC Rcd 8450 (1993) (NVNG MSS Order), where the Commission did not propose specific system design requirements for the non-voice non-geostationary (NVNG) MSS because all applicants could be accommodated.

²⁹ See United States v. Storer Broadcasting, 351 U.S. 192 (1956) (Storer Broadcasting). See, e.g., Licensing Space Stations in the Domestic Fixed-Satellite Service, 101 FCC 2d 223 (1985) (1985 Domsat Processing Notice), at paras. 11-12.

³⁰ Spread spectrum CDMA is a digital transmission technique in which the signal occupies a bandwidth larger than that needed to contain the information being transmitted. Because the signal is spread over a wide bandwidth, the power is dispersed and interference potential is reduced. The spreading is accomplished by modulating the signal by a code that is independent of the information data. A synchronized code in the receiver is used to despread the signal and recover the information. The spreading and the variation in the code permit a number of users to operate on the same frequency simultaneously without causing harmful interference.

multiple access (FDMA/TDMA) techniques.³¹ This system architecture would require each MSS Above 1 GHz system, whether a LEO or a GSO system, to operate on discrete frequency band segments. AMSC proposed to modify its authorized upper L-band GSO satellite to include the capability to operate in the Earth-to-space transmission direction in the 1616.5-1626.5 MHz band. It proposed to use either CDMA or narrowband FDMA access techniques.

13. The Committee's work plan called for it to develop rules that would maximize multiple entry and avoid or resolve mutual exclusivity among the applicants. The Committee could not reach a consensus, however, regarding a method by which the three proposed system architectures could co-exist and all applications could be granted. The Committee also could not agree to any in a series of compromise proposals developed by the FCC Representative and the Committee Facilitator that would have permitted all proposed systems to be licensed with some design modifications.³² Rather, the four CDMA LEO proponents, AMSC and Celsat concluded that the Commission should mandate a CDMA system architecture, with the systems operating over the entire available bandwidth.³³ In contrast, Motorola argued that band segmentation, with discrete band segments assigned to CDMA and FDMA/TDMA architectures, should be mandated.³⁴

14. After the Negotiated Rulemaking was concluded, the LEO applicants, in two new "partial settlement" groups, submitted two sharing proposals they assert would permit all LEO applications to be granted. Both proposals are premised on excluding GSO systems from consideration for licensing in these frequency bands. Both are also premised upon moving GLONASS, the Russian Global Navigation Satellite System now operating in the 1610-1616 MHz band, to frequencies below the allocated MSS bands and dividing the entire 1610-1626.5 MHz band among the five LEO applicants.³⁵

³¹ TDMA is a transmission technique in which the same frequency band is used by both uplink and downlink transmissions in alternating time slots. FDMA provides multiple discrete channels with different center frequencies.

³² In essence, these proposals divided the available bandwidth among the six applicants, with any unused spectrum reverting to the spectrum pool for reassignment to those licensees implementing their systems. The proposals were included in the Committee Report as Addendum 1, which was submitted by AMSC.

³³ See Committee Report, Annex 1/Attachment 1, at i. AMSC and Celsat endorsed this view, although AMSC expressed support for the compromise approach presented by the FCC Representative and Facilitator. See *id.*

³⁴ See Committee Report, Annex 1/Attachment 2, at 1.

³⁵ See paras. 53-57, *infra*, for a detailed discussion of the technical incompatibilities between MSS and GLONASS if GLONASS is used for aircraft approach communications.

15. The first proposal was filed by Motorola and LQSS, and was based upon one of the compromise proposals advanced during the negotiated rulemaking.³⁶ The plan, in essence, assigns spectrum on a "start and cut back" basis. Under the proposal, the first system ready to be launched would be authorized to operate in the entire allocated band. As additional systems become operational, spectrum would be divided among operational systems in proportion to the number launched. The plan would permit CDMA systems to share spectrum and to aggregate frequency assignments.

16. The three other LEO applicants, Constellation, TRW, and Ellipsat, opposed this proposal.³⁷ They assert that it creates an incentive for licensees of operational systems to delay or block entry by subsequent systems and that it will be extremely difficult to dislodge a licensee from spectrum it is using. They also assert that as long as the amount of spectrum a system will have access to is not known, it will be difficult to arrange financing. The three applicants submitted their own spectrum sharing plan. They state their proposal would permit all LEO applicants to be licensed and would ensure that "each [LEO] applicant has guaranteed access to an amount of usable spectrum ... that will permit it to commence operations and become economically viable."³⁸ Specifically, the proponents submit that FDMA/TDMA bidirectional systems should be assigned to 4 MHz at 1622.5-1626.5 MHz with 1 MHz at 1621.5-1622.5 held in reserve for FDMA/TDMA system expansion, and that CDMA systems should be assigned to 7.5 MHz of shared spectrum at 1614-1621.5 MHz with 4 MHz at 1610-1614 held in reserve for CDMA system expansion.

17. AMSC states that it strongly disagrees with the LEO applicants' proposals.³⁹ It asserts that the Commission can grant AMSC's application and those of the other applicants, although it does not provide a specific plan for doing so. AMSC further states that its proposal represents an incremental approach by a company proceeding with implementation of an MSS system and that the Commission should, under these circumstances, provide AMSC with the opportunity to use the requested spectrum.

2. Qualification Requirements

18. While we attempted to forge an agreement all parties found acceptable, any agreement would have required each applicant to make technical modifications to its proposed system that would have reduced the system capacity. Neither we nor the applicants could fashion a compromise that was acceptable to

³⁶ See Jointly Filed Comments, submitted by Motorola and LQSS (Oct. 7, 1993).

³⁷ Response of Constellation, Ellipsat, and TRW to "Jointly Filed Comments" (Oct. 20, 1993).

³⁸ Joint Spectrum Sharing Proposal, submitted by Constellation, Ellipsat, and TRW (Oct. 8, 1993), at 8-9.

³⁹ See Letter from Lon C. Levin, Vice President and Regulatory Counsel, AMSC to Kathleen B. Levitz, Acting Chief, Common Carrier Bureau (Dec. 3, 1993).

all. Given this, our threshold qualification requirements for the service will be designed to ensure that those awarded licenses can expeditiously implement state-of-the-art systems that further the public interest. All pending applicants who filed by the cut-off date will be afforded an opportunity to amend their applications to bring them into conformance with the adopted rules.⁴⁰ If applicants are unable to meet the basic qualifying criteria, their applications will be dismissed without additional hearing.⁴¹

a. Technical Qualifications

19. We have traditionally adopted technical requirements for each satellite service that reflect the nature of and entry opportunities for the particular service being licensed. In the domestic fixed-satellite service, for example, we adopted a full frequency reuse requirement for space stations to ensure spectral efficiency when it appeared that most of the available orbital locations had been assigned.⁴² Further, we adopted a wide-band spread spectrum CDMA requirement for RDSS systems when it appeared that all proposed RDSS systems could not be accommodated.⁴³ In doing so, we rejected a proposed FDMA system architecture. We noted that the FDMA architecture, proposed by Omninet Corporation, prevented spectrum sharing and limited multiple entry opportunities. In addition, we noted that Omninet's FDMA system was designed to provide a variety of mobile satellite services and that Omninet had, in fact, filed an identical system proposal in a contemporaneous proceeding to license an MSS system in the upper L-band frequencies.⁴⁴ We stated that potentially impairing CDMA RDSS operations by assigning at least half of the bandwidth requested by the CDMA RDSS applicants to an MSS system, as Omninet had suggested, was unwarranted since systems such as Omninet's were being considered for licensing in a separate proceeding. The technical requirements we propose for the MSS Above 1 GHz service are based upon similar concerns.

⁴⁰ See Cut-Off Notice, note 11, supra. Celsat did not file a system application by the cut-off date (nor has it yet filed an application). It therefore cannot be considered as part of the current processing group.

⁴¹ Storer Broadcasting, note 29, supra.

⁴² See Licensing of Space Stations in the Domestic Fixed-Satellite Service, 48 Fed. Reg. 40233 (Sept. 6, 1983) (Reduced Orbital Spacing), at para. 69.

⁴³ Amendment of the Commission's Rules to Allocate Spectrum for, and to Establish Other Rules and Policies Pertaining to, a Radiodetermination Satellite Service, 104 FCC 2d 650 (1986) (RDSS Licensing Order), at paras. 14-19.

⁴⁴ The license in this proceeding was later awarded to a consortium of the pending qualified applicants, American Mobile Satellite Corporation. See Memorandum Opinion, Order and Authorization in Gen. Docket No. 84-1234, 4 FCC Rcd 6041 (1989) (AMSC Authorization Order).

i. Orbit Considerations

20. Five of the six proposals we are considering here request authority to implement LEO satellite systems. These applications represent the world's first commercial voice-capable LEO mobile satellite proposals and, we believe, have the potential to contribute to the domestic and international public interest in manners in which a GSO system may not. First, the Communications Act requires us "to encourage the provision of new technologies and services to the public."⁴⁵ The LEO systems reflect a new commercial technology that permits satellites to operate at significantly lower altitudes than those in geostationary-satellite orbit.⁴⁶ Consequently, a communications link using a LEO satellite can shorten the transmission time between two earth stations, serving to reduce or eliminate the time delay that may now be present in satellite-delivered telephone service. Lower altitudes also provide additional options for system design. For example, they permit communications at a lower power between the satellite and terrestrial equipment. A LEO satellite is also not confined to an equatorial orbit as is a GSO satellite, enabling the LEO satellite to provide enhanced coverage to areas at higher latitudes, such as Alaska. A GSO system has been previously licensed to provide voice mobile-satellite services in the upper L-band (1545-1559/1646.5-1660.5 MHz) in the United States.⁴⁷ Thus, a LEO-only design requirement should provide U.S. customers with maximum access to a new, alternative voice-MSS technology, to the benefit of the public.⁴⁸

21. Further, the inherently global nature of LEO systems may create additional public interest benefits. Because LEO satellites pass over all countries in their orbits around the Earth, they are inherently capable of providing global service.⁴⁹ A GSO satellite, in contrast, is fixed relative to a point on Earth and consequently its "footprint" allows only regional service at best. Given this, a LEO industry may be uniquely positioned to foster social

⁴⁵ 47 U.S.C. § 7.

⁴⁶ GSO satellites operate 22,300 miles above the Earth's equator. The LEO applicants propose orbits ranging from approximately 475 miles to 6400 miles above the Earth's surface.

⁴⁷ AMSC Authorization Order, note 44, *supra*. Its licensee, AMSC, expects to launch its first satellite by the end of 1994. In addition to applying for additional frequencies for its two other authorized, but unconstructed, GSO satellites in this proceeding, AMSC has applied for authority to operate in the lower L-band at 1530-1544/1631.5-1645.5 MHz. AMSC's lower L-band application, and the comments filed in response, will be considered on their merits in a separate proceeding.

⁴⁸ 47 U.S.C. §§ 1, 7; Storer Broadcasting, note 29, *supra*.

⁴⁹ But see para. 23, *infra*, for a discussion of the limitations of certain highly elliptical orbits. Of course, LEO operators must meet any national requirements imposed by other countries before they may begin to provide service to that country. See paras. 91-92, *infra*.

and economic benefits in the United States and throughout the world. For example, the provision of global service by U.S. companies may spur a U.S. presence in the world economy by helping to expand markets for U.S.-produced goods and services. It is also possible that if the U.S. can maintain its leadership in developing and implementing LEO technology, U.S. global competitiveness in telecommunications will be significantly enhanced. Further, the efficiency and competitiveness of U.S. businesses may be improved by implementing state-of-the-art facilities that can meet their growing international communications needs. Finally, LEO systems may offer countries unable to participate in state-of-the-art telecommunications development immediate access to a technologically advanced communications infrastructure with only relatively minor incremental costs associated with additional gateways and user transceivers. This offers the potential for revolutionary advances in all areas supported by communications. These areas include, but are not limited to, health care, education, emergency communications from small villages, public safety, routine governmental and civic exchanges, industrial communications and monitoring, and manufacturing.

22. For these reasons, we propose to require MSS systems licensed in the 1610-1626.5/2483.5-2500 MHz bands to operate in non-geostationary orbits, as contained in proposed rule section 25.143(b)(2)(i). We request comment on this proposal from both applicants and potential users. Commenters should discuss in their pleadings the potential for MSS Above 1GHz systems to generate social, economic, and technical benefits, both domestically and globally, and the extent to which these benefits are realizable with LEO and GSO satellites. Applicants should also indicate with specificity the extent to which their proposed systems will foster these goals. In particular, applicants should describe the services they intend to provide, including, for example, their intended customer base and the manner in which they plan to offer the service. Prospective customers should specify their anticipated use or uses of MSS Above 1 GHz systems, including a discussion of whether equivalent services can be provided by LEO and GSO facilities and whether, and the extent to which, alternative terrestrial services are available.

ii. Global vs. Regional Coverage

23. While LEO systems are inherently capable of providing global service, their effectiveness for doing so varies with their orbital plane. In general, the higher a LEO satellite's orbit, the larger the area on Earth that can be "seen," and therefore served, by that satellite. Thus, a LEO satellite operating at varying altitudes, such as in a highly-elliptical orbit, may "see" a very large area of the Earth when it is at its highest altitude but only a small area of the Earth when it is at its lowest altitudes. This may prevent a LEO satellite constellation operating in a highly elliptical orbit from effectively serving all areas of the world. Given the potential domestic public interest benefits that an expanded U.S. role in the global communications infrastructure may produce, as discussed above, we propose to require each MSS Above 1 GHz applicant to demonstrate that its proposed system is capable of providing service to all areas of the world, with the exception of the polar regions, for at least 75% of every 24 hour period. That is, we propose that satellite systems be designed so that at least one satellite is visible above the horizon at an elevation angle of at least 5° for at least 18 hours each day at latitudes less

than 80°. We request comment on this proposal, which is contained in proposed rule section 25.143(b)(2)(ii).

iii. Continuous Coverage of the Fifty States

24. Consistent with Section 1 of the Act, we also believe it would serve the public interest to ensure that those entities licensed to operate on the limited MSS Above 1 GHz frequencies use those frequencies to provide efficient and ubiquitous service to users throughout the United States. We therefore propose to require each applicant to demonstrate that its proposed system is capable of providing continuous voice services to users throughout the fifty-states. That is, we propose that satellite systems be designed so that at least one satellite is visible above the horizon at an elevation angle of at least 5° at any given time in all areas of the United States.⁵⁰ We request comment in this proposal, which is contained in proposed rule section 25.143(b)(2)(iii).

iv. Other Technical Requirements

25. In addition, all applicants will be required to demonstrate compliance with our rules regarding inter-service sharing.⁵¹ We also request comment on whether any other technical requirements are warranted. For example, should we consider adopting a rule that requires MSS Above 1 GHz systems to contain or operate simultaneously in the United States a minimum number of channels for mobile services as a means of achieving maximum efficiency? Commenters should provide concrete justification for each suggested requirement, including an analysis of the perceived public interest benefits.

b. Financial Qualifications

26. In light of the huge costs involved in constructing and launching a satellite system, financial ability has always been considered a significant factor in determining whether an applicant is qualified to hold a license. Historically, the Commission has fashioned financial requirements for satellite services on the basis of entry opportunities in the particular service being licensed. This stems from our repeated experience that licensees without sufficient available resources will likely spend a significant amount of time attempting to raise the financing required to construct and launch a satellite

⁵⁰ In proposing this, we recognize that all systems will periodically experience brief outages whenever the transmission signal is blocked by obstructions such as foliage, buildings, or terrain. We also recognize that the transmission signal may be occasionally degraded by propagation phenomena. We emphasize that these unavoidable interruptions do not render the service "non-continuous."

⁵¹ See paras. 48-69, infra.

system and these attempts will often end unsuccessfully.⁵² Consequently, where a grant to an under-financed space station applicant may preclude a fully capitalized applicant from implementing its plans, and service to the public may be consequently delayed, a stringent financial demonstration has been mandated.⁵³ Where grant to an under-financed applicant will not prevent another from going forward, the required demonstration is less stringent. For example, in the radiodetermination satellite service, where all applicants could be accommodated with our mandated system architecture and future entry was possible, only a detailed business plan was required.⁵⁴ In contrast, in the domestic fixed-satellite service, where applications to implement space stations regularly exceed the number of available orbital locations for those satellites, evidence of full, irrevocable financing is required.⁵⁵

27. The Negotiated Rulemaking Committee could not agree to a method by which all six proposed systems could be licensed. Because a license award to one applicant could consequently preclude another applicant from implementing its system, we must ensure that those applicants that are licensed have the financial ability to proceed promptly. We recognize that the MSS Above 1 GHz service is a new and, as yet, commercially unproven service and that applicants without substantial internal assets may have difficulty obtaining the \$97 million to \$2 billion in financing they project is needed to construct and launch their space segments. We cannot, however, allow the orbit-spectrum resource to be tied up while these financing efforts are undertaken, with no assurance that they will be fruitful.⁵⁶ We therefore propose to adopt the same financial showing that is required in the domestic fixed-satellite service. That is, we propose to require applicants to provide evidence of uncommitted current assets or irrevocably committed debt or equity financing sufficient to meet the estimated

⁵² See, e.g., National Exchange Satellite, Inc., 7 FCC Rcd 1990 (Com. Car. Bur. 1992); Rainbow Satellite, Inc., Mimeo No. 2584 (Com. Car. Bur., released Feb. 14, 1985); United States Satellite Systems, Inc., Mimeo No. 2583 (Com. Car. Bur., released Feb. 14, 1985) (domestic satellite licenses declared null and void for failure to begin implementation as required by license). In addition, Geostar Corporation, a start-up company licensed in the radiodetermination satellite service, declared bankruptcy nearly five years after its licenses were issued. It had not built any of its satellites.

⁵³ This approach has not prevented smaller firms from participating in the satellite services market because ownership of a space station is not mandatory. Space station capacity can be leased or bought, and earth stations can be acquired at relatively low costs.

⁵⁴ RDSS Licensing Order, note 43, supra.

⁵⁵ Licensing Space Stations in the Domestic Fixed-Satellite Service, 50 Fed. Reg. 36071 (Sept. 5, 1985) (1985 Domsat Order).

⁵⁶ This is in contrast to the NVNG MSS, which is also a new service, but one in which all applicants could be accommodated and future entry appeared possible. See NVNG MSS Order, note 28, supra.

costs of constructing all planned satellites, launching them, and operating the system for the first year.⁵⁷

28. As in the domestic fixed-satellite service, this evidence may be provided through an audited financial statement or balance sheet current for the latest fiscal year or, if the applicant is relying on a credit arrangement or equity placement, through detailed documentation that includes the identity of the creditor or creditors, letters of commitment, all terms of the transaction, including required collateral, and the specifics of any sale or placement of any equity or other form of ownership interest. Further, acceptable credit or equity arrangements must demonstrate that financing has been approved and does not rest on contingencies that require further action by any party to the loan. That is, the instrument of financing must demonstrate that the lender has already determined that the applicant is creditworthy and, absent changed circumstances, is prepared to make the loan immediately upon a license grant by the Commission. Thus, fully negotiated loans that are contingent only upon the borrower obtaining a license would meet our proposed rules. In contrast, loans contingent on further action of the applicant, such as marketing a certain number of transponders on the system or entering into contracts with other parties, will not be considered sufficient, nor will letters from a financier indicating that it has an interest in the project or will assist in arranging financing once a license is granted. The proposed rules are contained in section 25.143(b)(3). We request comment on these proposals.

3. Processing Alternatives

29. Once we determine which applicants are qualified, we must then evaluate whether all qualified applicants can be accommodated in the available spectrum. If so, all may be granted licenses. If not, we must develop a further processing procedure to choose among the competing applications. We previously raised the matter of licensing procedures for the MSS Above 1 GHz service in the Competitive Bidding Implementation Notice.⁵⁸ Given the inability of the parties to the Negotiated Rulemaking to reach an agreement that would have permitted all six proposals to be accommodated, we solicited comments in that Notice regarding the possibility of awarding MSS Above 1 GHz licenses through an auction or a lottery. Nevertheless, our preferred processing alternative is to develop a plan to accommodate all qualified applicants. Based primarily upon information that has been filed after the Competitive Bidding Implementation Notice was issued, we believe that this may be possible. If it is not, however, we will need to resort to a further processing mechanism.

⁵⁷ 47 C.F.R. § 25.140. For LEO systems, "first year operational costs" are to be calculated for the year following the launch of the first satellite in the constellation.

⁵⁸ Implementation of Section 309(j) of the Communications Act - Competitive Bidding, PP Docket 93-253, FCC 93-455, 58 FR 53489 (released Oct. 15, 1993) (Competitive Bidding Implementation Notice).

a. Sharing Proposal

30. While a sharing solution could not be developed during the course of the Negotiated Rulemaking, we believe that the recent LEO sharing proposals may form the basis for allowing us to proceed expeditiously with licensing. Both of LEO applicants' proposals appear to allow up to five LEO systems to be accommodated in the 16.5 MHz spectrum allocated to MSS in each transmission direction. This may be sufficient to allow all qualified applicants to be licensed.⁵⁹

31. Our sharing proposal assumes, as do both of the LEO applicants' plans, that CDMA systems may share the same bandwidth and that FDMA/TDMA systems must operate on discrete frequencies. With this assumption, our plan assigns specific frequencies to each of the two technologies. Our proposed spectrum assignments are based upon recent statements made by the LEO applicants regarding their requirements. In the TRW/Constellation/Ellipsat proposal, the three CDMA applicants propose a 7.5 MHz assignment for CDMA systems, with 4 MHz held in reserve for CDMA system expansion. Because LQSS's CDMA system does not appear to have MSS spectrum needs significantly different from the other CDMA applicants' systems, we have assumed that the LQSS system is accommodated under the TRW proposal.⁶⁰ Thus, we assume that 11.5 MHz is sufficient to accommodate up to four operational CDMA systems. Motorola's spectrum requirements are based primarily upon a pleading filed by Motorola on August 10, 1993 regarding sharing possibilities. In that pleading, Motorola stated that "if...5.25 MHz were allocated for FDMA/TDMA systems, Motorola could not share its portion of the band with any other FDMA/TDMA system and still have access to enough spectrum to be

⁵⁹ We recognize that the interference problems between MSS and certain proposed applications on GLONASS, the Russian Global Navigation Satellite System, would not permit co-frequency co-system coverage in the United States in the 1610-1616 MHz band. See discussion at paras. 53-57, infra. However, as discussed in more detail below, we are encouraged that even if GLONASS is used for these enhanced incompatible operations, the GLONASS system will be moved to frequency bands below 1610 MHz. Accordingly, we will assume, for purposes of MSS Above 1 GHz system licensing, that the entire 1610-1626.5 MHz band will be available for MSS operations, at least in the long term. Nevertheless, we recognize that a GLONASS transition to bands below 1610 MHz may not be completed when the first MSS satellites are launched in the late 1990's. In this case, we would need to develop a transitional plan for MSS migration into the vacated 1610-1616 MHz band, with MSS licensees operating on less than the full amount of their assigned spectrum during the initial phases of their operation.

⁶⁰ We note that the agreement among the CDMA applicants that was submitted in the Committee Report included LQSS, and has not been withdrawn. See note 33, supra.

economically viable."⁶¹ We infer from this that Motorola could successfully operate on 5.25 MHz of bandwidth and we use this as Motorola's spectral requirement. Indeed, the Motorola/LQSS proposal suggests that as little as 3.3 MHz may be sufficient to accommodate Motorola.⁶²

32. By using an 11.5 MHz shared spectrum requirement for CDMA systems and a 5.25 MHz individual system requirement for an FDMA/TDMA system, up to five systems could be accommodated in the allocated 16.5 MHz of bandwidth if each technology were to operate over 1.3% to 1.9% less than the targeted bandwidths. We believe that this small reduction in capacity should not affect any system's ultimate viability. Consequently, we propose to assign CDMA systems to 11.35 MHz of shared bandwidth at 1610-1621.35 MHz and an FDMA/TDMA system to 5.15 MHz of dedicated bandwidth at 1621.35-1626.5 MHz.⁶³ When a system is launched and ready to begin operating, we will permit it to operate over the entire assigned bandwidth for that technology. Any in-orbit CDMA system will be required to operate compatibly with any newly launched CDMA system. In this manner, we believe we can grant the applications of up to five qualified applicants, which may permit licenses to be awarded without the need for further proceedings.⁶⁴

⁶¹ See "Motorola's Views of the Essential Elements of a Successful Spectrum Sharing Plan for 'BIG LEOS,'" (filed Aug. 10, 1993), at 14 (emphasis added).

⁶² In the Motorola/LQSS proposal (see para. 15, *supra*), the proponents assert that "[i]f any MSS/RDSS band sharing plan is to avoid mutual exclusivity while maintaining the economic viability of the proposed systems, it is imperative that the Commission [make] the entire 16.5 MHz of spectrum in the L-band [available] to MSS." At 5. The Motorola/LQSS proposal involves dividing the available spectrum equally among fully operational systems. While the proposal also suggests financial and technical requirements similar to the ones we are proposing, the proponents nowhere indicate that any LEO applicant will be found unqualified. We can infer from this that Motorola believes it could operate in its one-fifth share of the 16.5 MHz available, or 3.3 MHz.

⁶³ Our proposed spectrum sharing plan represents our intended objectives for dividing the 1.6 GHz band for operations covering the U.S. In view of the requirement for international coordination referred to in paras. 91-92, *infra*, full use of the authorized band in border areas or any overlapping coverage areas of different systems may depend upon agreements with other countries. Moreover, the applicability of the plan outside the U.S. will necessarily depend upon authorizations granted by the countries concerned.

⁶⁴ Indeed, if a start-up requirement of 7.5 MHz is used for CDMA systems and 3.3 MHz for a FDMA/TDMA system, it may be possible to operate five systems, at least initially, over less than 16.5 MHz of bandwidth. If the 1610-1616 MHz band is not immediately available to MSS Above 1 GHz operators, these initial requirements may be used as the foundation for any interim spectrum sharing plan.

33. While we are optimistic that all licensed systems will be built, we recognize that this may not occur. In the unlikely event that only one CDMA system is implemented, we propose to reduce the bandwidth assigned to that system from 11.35 MHz to 8.25 MHz, even if some of the system's space stations are in-orbit and operating.⁶⁵ An 8.25 MHz assignment should be sufficient to implement a viable system and should also provide us with some flexibility when coordinating the system. It may also provide some room for expected growth.⁶⁶ We propose to begin to reexamine spectrum assignments one year after licenses are awarded. At that time, all licensees will have been required, by the terms of their licenses, to begin constructing at least the first two satellites in their systems.⁶⁷ The licenses of those entities that have not begun construction will be rendered null and void by their own terms. Consequently, if only one CDMA licensee has met its construction commencement milestone, the spectrum assignment for that system -- as the sole licensed CDMA system -- will be automatically adjusted without hearing. If multiple CDMA licensees begin construction as required, as we expect, we will continue to monitor compliance with each licensee's remaining implementation milestones. Should only one CDMA licensee continue to proceed with implementation, we propose to adjust without hearing, any "excess" spectrum assignment to that system.

34. We propose to limit the operations of a single CDMA system to the 1610-1618.25 MHz spectrum segment. The 3.1 MHz of spectrum made available at 1618.25-1621.35 MHz could then be reassigned to an FDMA/TDMA licensee upon a showing of need. If an FDMA/TDMA system licensee has not met its implementation milestones or, if it has, cannot demonstrate the need for additional spectrum, the freed 3.1 MHz of spectrum could be made available to new entrants. Conversely, if an FDMA/TDMA system is the only MSS Above 1 GHz system implemented, the FDMA/TDMA operator would be limited to expanding its operations, upon a demonstration of need, to 8.25 MHz at 1618.25-1626.5 MHz. By limiting individual systems to an 8.25 MHz maximum assignment in this manner, we should be able to consider licensing an additional entity or entities in any unused 8.25 MHz band segment.

35. Our plan does not propose to hold spectrum in reserve for system expansion, as suggested in the TRW/Ellipsat/Constellation proposal. It also does not propose a formula for assigning each system to only a portion of its spectrum until the system becomes fully operational, as suggested in the Motorola/LQSS proposal. Even assuming that all spectrum assigned to MSS Above 1 GHz operators

⁶⁵ We propose to include this limitation in each system authorization.

⁶⁶ While we have recognized the value of allowing room for growth, licensees are cautioned that we would consider cancelling a portion of the assignment if the licensee is not fully using the spectrum. See, e.g., 1985 Domsat Order, note 55, supra, at paras. 23 and 25 (adopting rule assigning existing domestic satellite operators to one additional orbital location in each frequency band as a means of accommodating growth, but noting Commission policy requiring co-location of underutilized in-orbit GSO satellites).

⁶⁷ See discussion at para. 84, infra, regarding implementation milestones.

can be coordinated internationally, we expect that licensed entities (with the exception of a sole CDMA operator, whose assignment will be adjusted, see above), will be able to make full use of their assigned spectrum -- which is considerably less than initially requested in their applications -- even before their satellite system constellations are completely launched. Once a certain number of satellites are in-orbit, the licensee's spectral needs do not continue to increase as additional satellites are launched and operational. Rather, adding satellites after this number is reached allows the quality of service to be improved over the operating bandwidth, without creating any additional need for spectrum. The operative minimum number of satellites, however, varies from system to system and is based upon several factors, including the altitude and other characteristics of the orbital plane, the proposed system capacity, the traffic demand, and the development of the ground segment. This analysis is complicated further when, as here, multiple systems are to share the same frequencies. In addition to creating potential inequities, a spectrum sharing plan based upon the number or percentage of satellites in-orbit at any given time during a several year launch period when multiple systems are involved would necessitate constant changes to each system's frequency plan and would be exceptionally difficult to administer.

36. Consequently, we propose to authorize a licensee to operate its system over the designated amount of bandwidth for that technology regardless of the number of satellites launched. Licensees are warned, however, that if they do not launch a sufficient number of satellites to allow them to meet the technical requirements for this service (e.g., any requirements we may adopt regarding global coverage and continuous voice service over the United States), by the implementation milestones in their licenses, their system authorizations, by their own terms, will be rendered null and void.⁶⁸ As such, the operator will not be licensed to launch or operate additional satellites nor will it be afforded any replacement expectancy for a second generation system. At that time, we may consider adjusting existing spectrum assignments.

37. Finally, our plan includes the 1.6 GHz band only. We assume that CDMA systems assigned to shared 1.6 GHz uplink spectrum will need a corresponding amount of 2.4 GHz downlink spectrum.⁶⁹ We recognize, however, that if a bi-directional FDMA/TDMA system is authorized to operate on a portion of the 1.6 GHz band, it will not need downlink spectrum at 2.4 GHz. This would free some spectrum in the 2.4 GHz band and provide us with some flexibility in assigning specific downlink spectrum segments to CDMA licensees. For example, we may decide to avoid licensing in those portions of the 2.4 GHz band that are

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See para. 84, infra.

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We request comment on this assumption. Commenters should provide a concrete technical justification for any proposed unequal uplink and downlink spectrum assignments.

especially susceptible to inter-service interference.⁷⁰ Thus, while we propose to authorize CDMA operators to share the same amount of downlink spectrum as uplink spectrum, we do not propose specific frequencies for downlink operations at this time. Rather, we propose to consider appropriate downlink frequencies for CDMA systems when those systems are licensed.

38. We request comment on all aspects of our sharing proposal, particularly on whether it may be used as a framework for resolving mutual exclusivity among the qualified applicants. Any applicant asserting that the plan does not provide sufficient capacity for its system must indicate with specificity the minimum spectrum required to support its system, supporting this assertion with a concrete analysis, and must propose a plan that accommodates the reasonable requirements of all qualified applicants.

b. Other Alternatives if Mutual Exclusivity is not Resolved

39. If our spectrum sharing proposal, or some variation of it, is not adopted or does not permit the applications of all qualified applicants to be granted, we must devise a procedure for choosing among the mutually exclusive applications. Possibilities include a comparative hearing, an auction, or a lottery. We briefly discuss the alternatives below, and, to expedite MSS Above 1 GHz licensing, we propose structures for both an auction and a lottery. By doing so, we will be in a position to implement any chosen procedure as quickly as possible should we be unsuccessful in developing a framework that resolves mutual exclusivity.

i. Comparative Hearing

40. If we find we cannot grant licenses to all qualified applicants, we could hold a comparative hearing to attempt to determine which of the qualified applicants' systems best serve the public interest. The Commission's experience with comparative hearings has shown they usually are prolonged. Here, they would not only delay the provision of needed service to the United States public with no certainty that the system ultimately implemented will be superior to one that could have been more expeditiously authorized through another licensing mechanism, but also could also disadvantage the United States in coordinating a licensed system internationally. Without a U.S. licensee with a concrete system proposal, international coordination efforts for a U.S. system could be hindered.⁷¹ Other countries have expressed an interest in implementing mobile satellite systems in these bands and will go forward with the international coordination procedure for their systems regardless of the status of our domestic

⁷⁰ See paras. 60-69 for a discussion of the potential interference problems between MSS and other services operating in the 2483.5-2500 MHz band or in adjacent bands.

⁷¹ See Tentative Decision, 6 FCC Rcd 4900 (1991) (AMSC Remand Proceeding), at paras. 33-53, for a detailed discussion of the importance of timely participation in the international frequency coordination process with an authorized U.S. licensee.

licensing process.⁷² The United States will not be able to participate effectively in those negotiations, and will have difficulty securing sufficient spectrum for U.S. systems, if it cannot present a definitive U.S. proposal in a timely manner. For these reasons, it may not be advisable to hold a comparative hearing. We request comment on this tentative decision.

ii. Auction

41. The Omnibus Reconciliation Act of 1993, Title VI - Communications Licensing and Spectrum Allocations Improvements (Budget Act) gives the Commission the authority to employ competitive bidding procedures to select licensees from among two or more mutually exclusive applicants provided that certain criteria are met.⁷³ Bidding may apply to a use of the electromagnetic spectrum if we determine that:

...the principal use of such spectrum will involve, or is likely to involve, the licensee receiving compensation from subscribers in return for which the licensee (i) enables those subscribers to receive communications signals that are transmitted utilizing frequencies on which the licensee is licensed to operate; or (ii) enables those subscribers to transmit directly communications signals utilizing frequencies on which the licensee is licensed to operate...

provided that other statutory objectives are promoted.⁷⁴ These include developing and rapidly deploying new technologies, without administrative or judicial delays; promoting economic opportunity and competition and accessibility to the public by disseminating licenses among a wide variety of applicants, including small businesses; recovering for the public a portion of the value of the spectrum; and promoting efficient and intensive use of the spectrum.⁷⁵

42. We believe that if we cannot adopt a plan that will resolve mutual exclusivity among the qualified MSS Above 1 GHz space station applicants, an auction should be considered. MSS Above 1 GHz space station licensees will be providing a commercial subscription-based service that will enable subscribers to transmit or receive MSS transmissions in the frequencies on which the MSS space stations will be licensed to operate. While the statute requires that licensees receive compensation from subscribers in return for enabling those

⁷² Germany, Tonga, Canada, France and Inmarsat have advance published plans for both LEO and GSO systems in the 1.6/2.4 GHz bands with the International Telecommunication Union Radiocommunication Bureau (ITU-BR). Feeder link frequencies for MSS systems must be coordinated as well, further complicating the coordination process.

⁷³ 47 U.S.C. § 309(j).

⁷⁴ 47 U.S.C. § 309 (j) (2) (A), (B).

⁷⁵ 47 U.S.C. § 309(j) (3).

subscribers to receive and transmit communications signals, we do not believe that this implies that there must be a direct service arrangement between end users and space station licensees. The House Report states that "where the Commission determines that the principal use of the spectrum will be to, in essence, resell the spectrum to subscribers, and [where the objectives of Section 309(j)(3) are met], then that class of licenses should be subject to competitive bidding."⁷⁶ Thus, even if particular MSS Above 1 GHz space station licensees provide service to end user subscribers through service vendor resellers, as most applicants have proposed, this should not affect our authority to implement an auction to award licenses for the service. In any event, at least one applicant, Constellation, has represented that it plans to provide some MSS Above 1 GHz service directly to users,⁷⁷ and historically, this is the manner in which mobile satellite services have been offered.⁷⁸ Further, several of the pending applicants proposing to offer service through resellers have stated that they will receive a specified portion of the subscriber revenues pursuant to their contracts with their resellers.⁷⁹ Given the pending proposals and the fact that we do not intend to preclude MSS Above 1 GHz licensees from offering service directly to users, we find that the MSS Above 1 GHz "class of licenses" would fall within even a literal reading of the statute.⁸⁰

⁷⁶ H.R. Rep. No. 103-111, 103rd Congress, Second Session, at 253.

⁷⁷ Constellation Application at 17.

⁷⁸ RDSS licensee Geostar provided and MSS licensee AMSC is providing end services to users through their own licensed earth segments, including mobile user transceivers. AMSC also leases space segment capacity directly to service vendors for resale. See Geostar Corporation, 2 FCC Rcd 1184 (1987); AMSC Subsidiary Corporation, et. al, 7 FCC Rcd 942 (1992); AMSC Subsidiary Corporation, Application File No. 2823-DSE-P/L-93.

⁷⁹ LQSS, for example, stated in its application that revenues from subscribers would be shared between LQSS and its resellers according to a specified formula. LQSS Application at 44. Ellipsat cited a similar plan, noting that it expected to generate "consolidated revenues" of about \$700 per year per subscriber. Ellipsat Application at 34.

⁸⁰ We do not believe the example provided in the Conference Report to the legislation is to the contrary. The example noted that Instructional Television Fixed Service (ITFS) licensees who lease unused frequencies to Multi-Channel Multipoint Distribution Service (MMDS) operators are not receiving compensation from "subscribers" within the meaning of Section 309(j)(2). See H.R. Rep. No. 103-213, 103rd Congress, First Session, 481-482(1993). In that case, however, the ITFS operator is receiving compensation for a use that is not the "principal use" of the spectrum. In the MSS Above 1 GHz service, in contrast, space station capacity would be sold or leased to resellers to enable them to provide mobile-satellite services to end-users, which is the principal use of the allocated MSS spectrum.

43. Further, conducting an auction to resolve mutual exclusivity among the qualified MSS Above 1 GHz applicants appears to further other public interest objectives advanced by the statute. A competitive bidding system should permit a new service to be more rapidly introduced than would a comparative hearing. It should also allow the public to recover the value of the public spectrum resource being made available for commercial use. Further, it should encourage efficient use of the electromagnetic spectrum. An applicant participating in the bidding process would be forced to develop concrete, comprehensive and realistic business plans in preparing its bids. This analysis should assist in implementating the proposed system and in its ultimate success. An applicant would also bid for only the minimum amount of spectrum needed, encouraging a spectrum efficient design. We recognize that the statute also directs us to promote economic opportunity by disseminating licenses to a wide variety of licensees, including small and minority businesses. We request comment on the manner in which this statutory obligation can be taken into account in auctions for these types of services.

44. While auctions may appear advantageous for the reasons noted above, the approach might have unintended consequences internationally. In particular, other countries may also look to our lead in imposing licensing costs on MSS Above 1 GHz systems. Given the number of countries that may be served by LEO systems, these costs may be considerable. Indeed, they may effectively preclude a U.S.-owned system from serving other countries. It is possible, of course, that these costs may not be significant in countries that seek to ensure that voice mobile satellite services are provided within its borders. Further, applicants will pay no more than that which they determine is consistent with their expected revenues from providing service in that country. Nevertheless, the international nature of LEO service raises concerns that are not applicable to the domestic-only services for which auctions are implemented and we will carefully consider these issues.

45. We envision that if an auction is employed, it will be conducted pursuant to the general framework adopted in the Competitive Bidding Implementation proceeding. We propose here the necessary service specific criteria for the MSS Above 1 GHz service. First, to maximize multiple entry and to encourage applicants to bid only for the minimum amount of spectrum they require, in the event a competitive bidding approach is adopted, we propose to auction the total spectrum allocated for the MSS Above 1 GHz service in discrete frequency blocks.⁸¹ As discussed, it appears possible to implement viable systems over significantly less than the amount of spectrum initially requested by the applicants. Indeed, it appears that as little as 2.0 MHz to 4.0 MHz may provide an individual CDMA system with the same capacity as it would have operating on a shared basis over 11.5 MHz of spectrum in each transmission

⁸¹ We recognize that there are certain portions of the spectrum in which sharing may be possible among all applicants seeking to use those particular frequencies (i.e., only applicants proposing CDMA systems seek to operate in the 1610-1616 MHz and 2483.5-2500 MHz bands). However, these frequencies cannot in themselves accommodate all proposed CDMA systems. Consequently, they cannot be separated from the rest of the MSS frequencies in determining whether mutual exclusivity exists and whether auctions may be employed.

direction, as advanced in the TRW/Ellipsat/Constellation proposal.⁸² Consequently, we propose to auction the spectrum in paired 2.0625 MHz uplink and downlink segments, with eight paired segments available for licensing. To afford licensees some flexibility in designing their systems and to allow for the uncertainties of the international coordination process, we propose to allow applicants to bid successfully on up to four 2.0625 MHz paired segments, for a total of 8.25 MHz of spectrum in each transmission direction. This should provide ample spectrum to support a first-generation MSS Above 1 GHz system, and should provide some flexibility in coordinating the system internationally.⁸³ It may also provide some room to accommodate growth. Finally, given the CDMA applicants' proposals to share spectrum, we question whether we should permit permittees to agree to do so. That is, if multiple licenses can be awarded for the same band segment, should we permit successful bidders to agree among themselves to implement co-frequency systems? Should we indicate that, in these cases, we will issue licenses permitting operations over this increased bandwidth? We request comment on all aspects of our proposed auction framework.

iii. Lottery

46. Section 309(i) of the Budget Act authorizes the use of a lottery to select from among one or more mutually exclusive applicants if the applications are accepted for filing before July 26, 1993. We tentatively conclude if mutual exclusivity among the qualified applicants cannot be resolved, the statutory requirements for use of a random selection procedure are met. Specifically, a new service is being initiated, resulting in mutually exclusive applications and all applications were accepted for filing before July 26, 1993. Further, a lottery would expedite grant of a license, at least compared with a comparative hearing. This would speed the process of getting service to the public and also would allow the United States to proceed in international coordination activities in a more timely manner. A system licensed through a lottery should be capable of providing fully adequate service to the public.⁸⁴

⁸² See discussion at para. 31, supra. We used the proposed channel capacity of each individual CDMA system operating over 16.5 MHz of shared bandwidth to determine the amount of dedicated bandwidth that would be required to support the same number of channels. Compare Table 7, Case 8 of the Committee Report at 5-24 with Table 5 at 5-19. We then extrapolated new dedicated bandwidth requirements that reflect the proportionate values for the 11.5 MHz of shared bandwidth later requested.

⁸³ See para. 33, supra.

⁸⁴ See Amendment of the Commission's Rules to Allow the Selection From Among Certain Competing Applications Using Random Selection or Lotteries Instead of Comparative Hearings, 93 FCC 2d 952 (1983), recon. denied, 49 Fed. Reg. 49466 (Dec. 20, 1984). See also Public Mobile Services (Nationwide Paging Service), 57 Rad. Reg. 2d 1416 (1985) (lottery adopted where 16 mutually exclusive applications were filed and differences among the applicants' qualifications were minimal).